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Project Title: Development of Digital Disease Diagrams for Assessing FHB of Barley.

PROJECT 2 ABSTRACT

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Fusarium head blight (FHB) is one of the most devastating and insidious diseases of barley. The deployment of resistant cultivars is the most effective and environmentally sound means of managing FHB, but is best used in conjunction with cultural practices that reduce pathogen inoculum and also fungicide application. Many projects funded by the USWBSI on barley require a reliable and efficient method for assessing FHB severity. This includes studies of resistance in germplasm and breeding lines; effectiveness of various residue management treatments in reducing pathogen inoculum; efficacy of chemicals and biologicals in controlling FHB; and various epidemiological parameters affecting disease spread.

Our overall goal is to reduce the losses caused by FHB, especially those incurred by producers as a result of quality discounts from DON. Techniques that increase the efficiency of disease phenotyping will hasten the development of effective strategies for managing FHB. Thus, the objectives of this study are to 1) develop a refined and comprehensive set of digital disease images for estimating FHB severity in both six-rowed and two-rowed barley, and 2) assess the accuracy, reproducibility, and efficiency of using these disease images for estimating FHB severity in various applications. Digital color images will be taken of FHB-infected barley spikes collected from the field. Then, we will "digitally cut" select archetypal healthy and diseased spikelets from the images and use them as "building blocks" to create idealized six-rowed and two-rowed spikes exhibiting various disease severities. Once these diagrams are completed, several different research groups will join with us to test the accuracy, reproducibility, and efficiency of using these disease images for assessing FHB severity in various applications. The outputs from this research will have application for a number of programs across different Research Areas within the USWBSI. It therefore embodies the spirit of Integrated/Interdisciplinary Research (IIR) for collaboration and integration. However, the proposal also addresses specifically, the Variety Development and Uniform Nurseries (VDUN) priority of "enhancement of accuracy and consistency of FHB resistance phenotyping." The successful completion of these digital disease images will help investigators increase the accuracy and efficiency of their FHB assessments, thereby hastening the development of more effective management strategies for reducing FHB and associated mycotoxins.